

### **Amendments to the Drawings**

The attached sheets of drawings include changes to Figures 1-18. The attached sheets (12 sheets) marked "Replacement Sheet" include Figures 1-18 and replace the original sheets for Figures 1-18.

Attachment: Replacement Sheets (12 sheets)  
Annotated Sheets (18 sheets)

**Remarks**

Applicant has amended Figures 1-18 to correct the deficiencies in the drawings as requested in the Notice to File Corrected Application Papers, mailed May 10, 2007. In particular, Applicant submits herewith Replacement Sheets for Figures 1-16 that do not include a Date Stamp. In addition, Applicant has amended the figures to removed the text in the legend because this text is already included in the "Brief Description of the Drawing" section of the Specification. These amendments are noted on the Annotated Sheets. Applicant submits that no new matter is added by these amendments and that the case is now ready for issuance.

Applicant's understanding is that no fees are associated with this Response. However, if Applicant is mistaken, please charge any fees that may be required for the processing of this Response to our Deposit Account Number 03-1721.

Respectfully submitted,



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## Annotated Sheet



Leaky mode -- refracted wave into cladding; energy lost from core to cladding.

Guided mode -- no refraction, but evanescent tail into cladding; no energy lost from core unless absorbing species within decay range.

~~Figure 1: Optical fiber cross-section along the direction of propagation of light.~~

Fig. 1

## Annotated Sheet

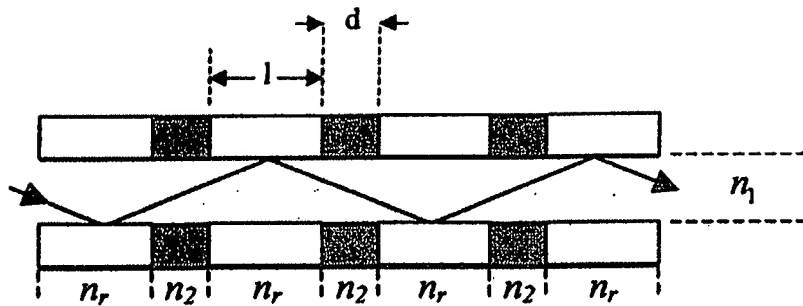
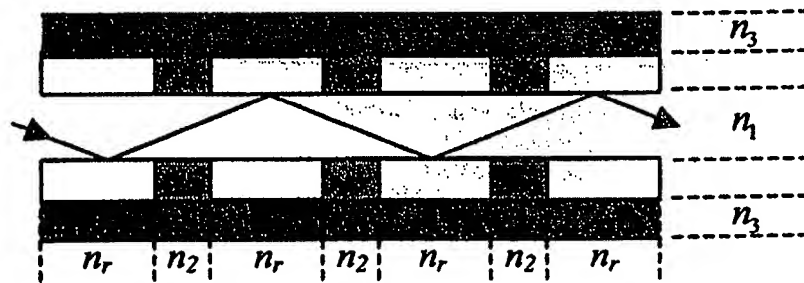


Figure 2: Distribution of reactant regions on fiber. The lightly shaded regions of length  $l$  contain the reactants; these regions are separated by a distance  $d$ . The index of the original cladding is  $n_2$ , while  $n_r$  is the refractive index of the substituted cladding that acts as the host for the reactants.

Fig. 2

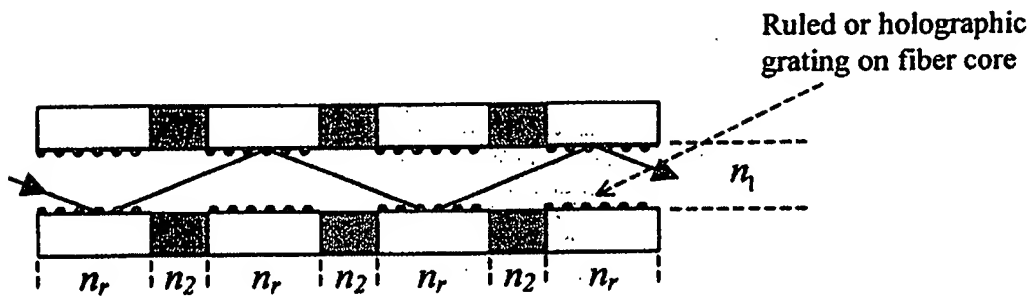
# Annotated Sheet



~~Figure 3: Optical fiber with an additional layer of cladding with refractive index  $n_3$ .~~

Fig. 3

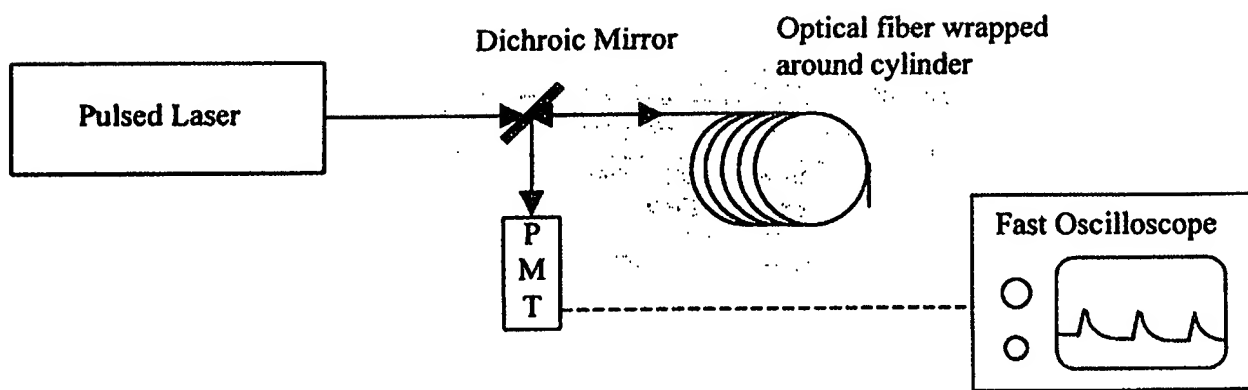
## Annotated Sheet



*Figure 4: Enhancement of the core-cladding and cladding-core coupling efficiency using a grating at the fiber-cladding interface.*

Fig. 4

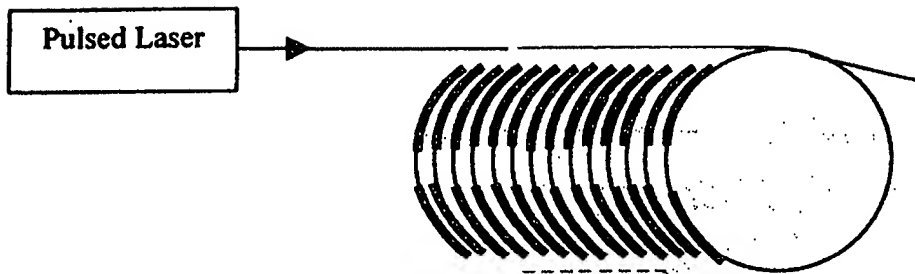
## Annotated Sheet



~~Figure 5: Basic experimental setup: A photomultiplier tube (PMT) connected to a fast oscilloscope records the fluorescent light emitted into the fiber after pulsed laser excitation through the fiber.~~

Fig. 5

## Annotated Sheet

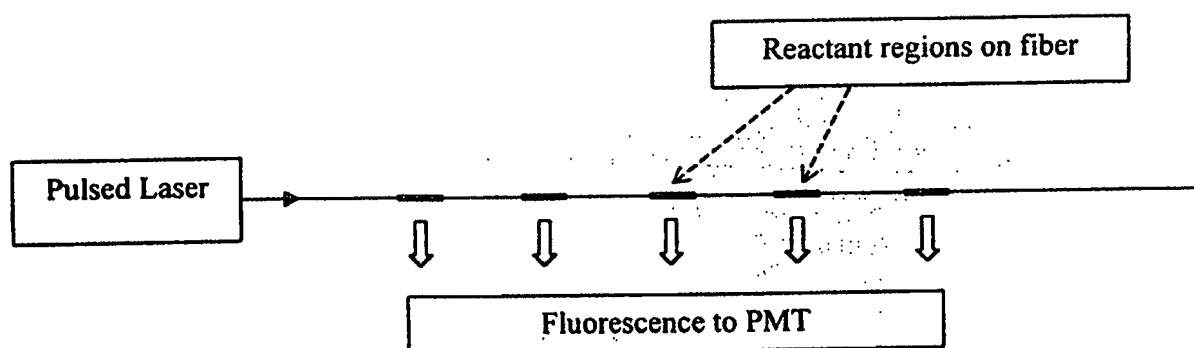


~~Figure 6: Optical fiber mounted on cylinder. The dark lines represent the reactant regions.~~

Fig. 6



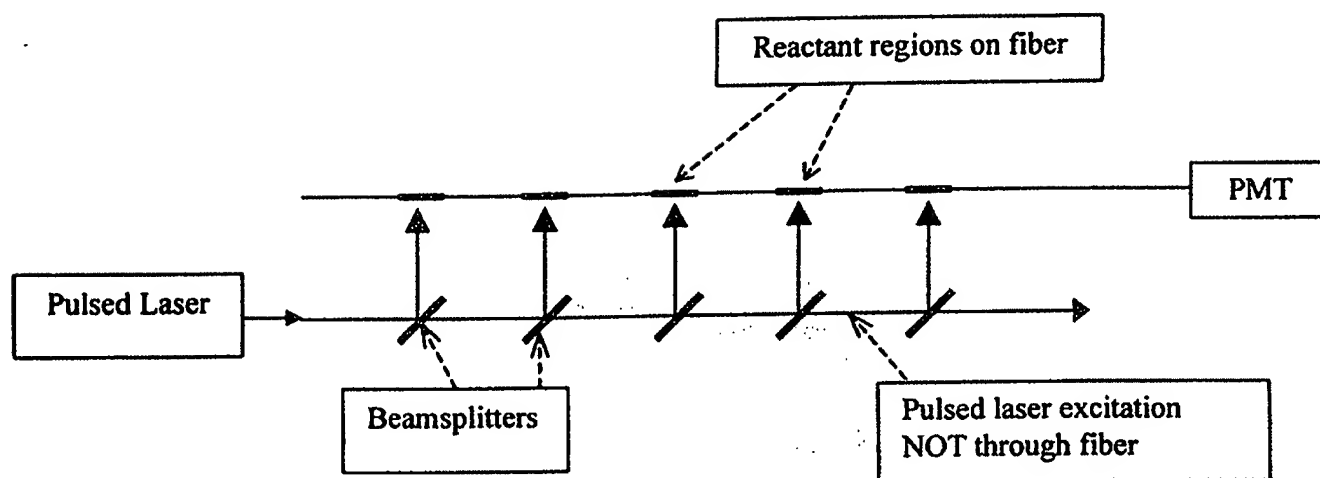
## Annotated Sheet



~~Figure 7: "Sideways" detection of the fluorescence emitted by the reactant regions for a linear fiber.~~

Fig. 7

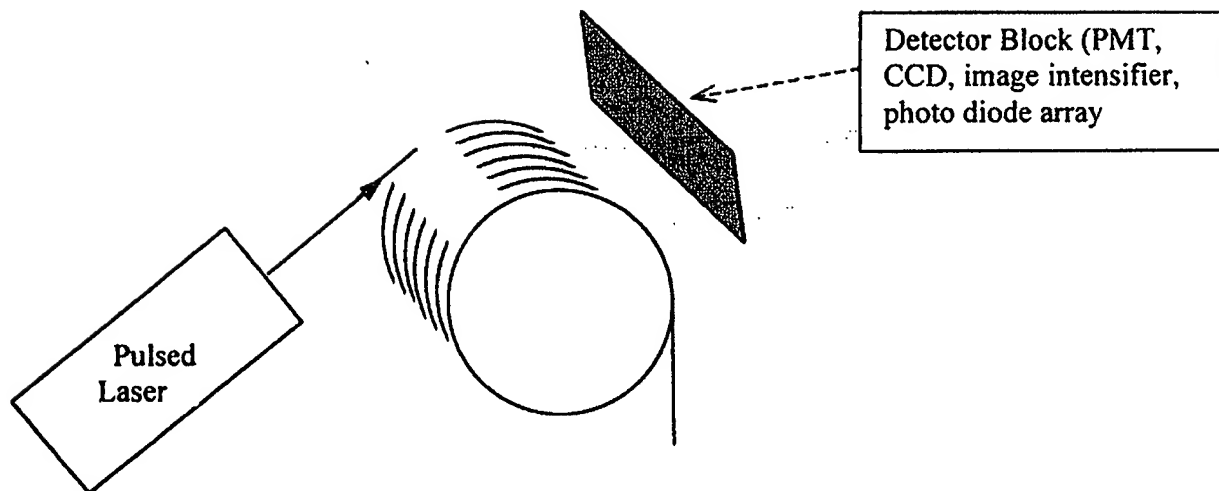
## Annotated Sheet



*Figure 8: "Sideways" excitation of the reactant regions on the fiber. The fluorescence is picked up by the fiber and guided to the PMT.*

Fig. 8

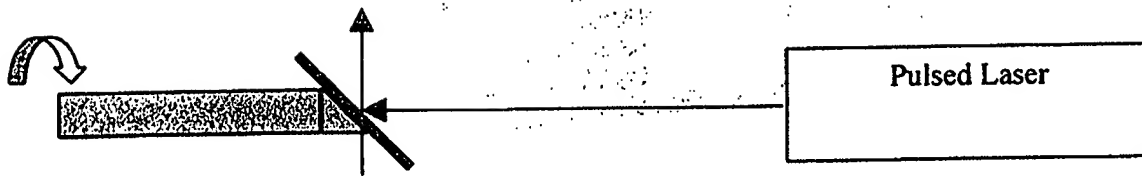
## Annotated Sheet



*Figure 9: "Sideways" detection scheme for fiber mounted on cylinder. The detector block contains photomultiplier tube(s), charge coupled devices (CCD's) with/without image intensifiers, or photodiode arrays.*

*Fig. 9*

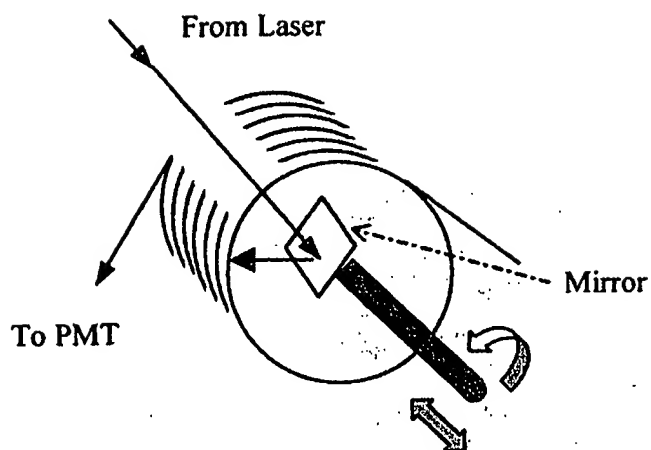
## Annotated Sheet



*Figure 10: Mirror mounted at 45 degrees on a rotation rod, causing the laser light directed onto the mirror to rotate in space.*

*Fig. 10*

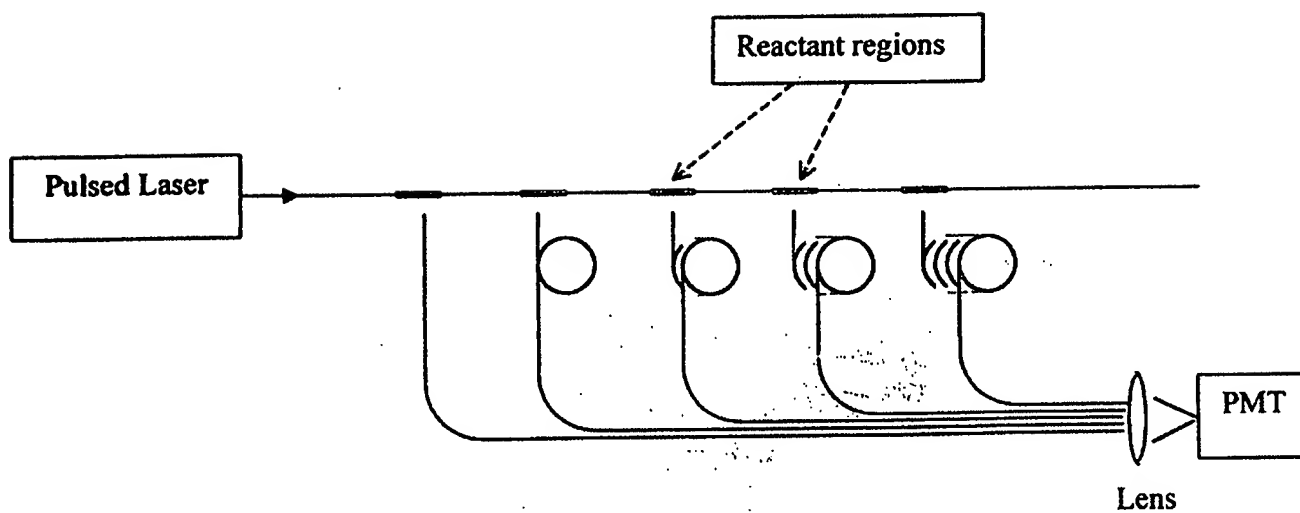
## Annotated Sheet



*Figure 11: Rotating mirror mounted inside of the cylinder. The laser beam is widened with cylindrical lenses to excite a range of reactant regions.*

Fig. 11

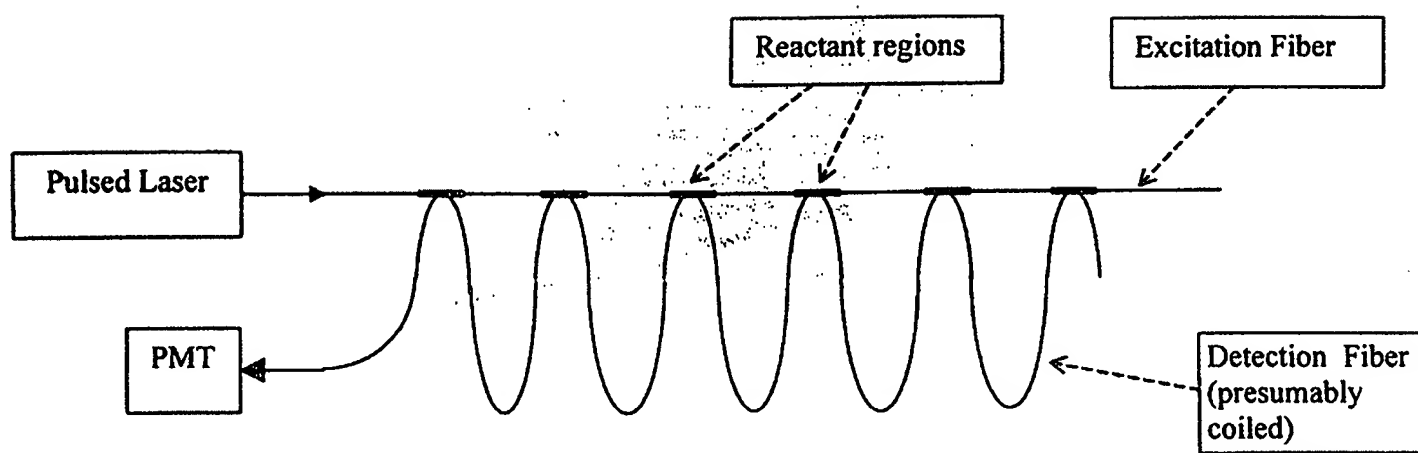
## Annotated Sheet



*Figure 12: (N+1) fiber scheme: one excitation fiber, which also supports the reactant regions with a detection fiber for each of the N reactant regions. The pickup fibers have different lengths to delay the arrival of the fluorescence signals from different reactant regions at the photomultiplier (PMT).*

Fig. 12

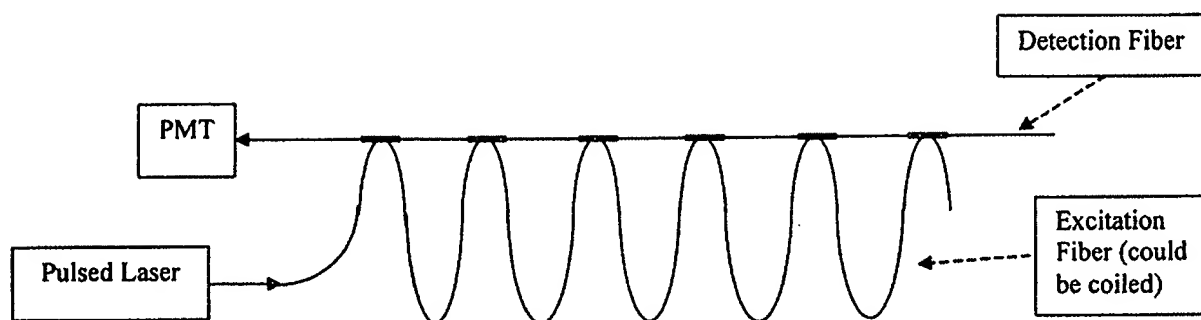
## Annotated Sheet



~~Figure 13: Two-fiber scheme: one excitation fiber containing the reactant regions and one detection fiber that periodically contacts the reactant regions.~~

Fig. 13

## Annotated Sheet

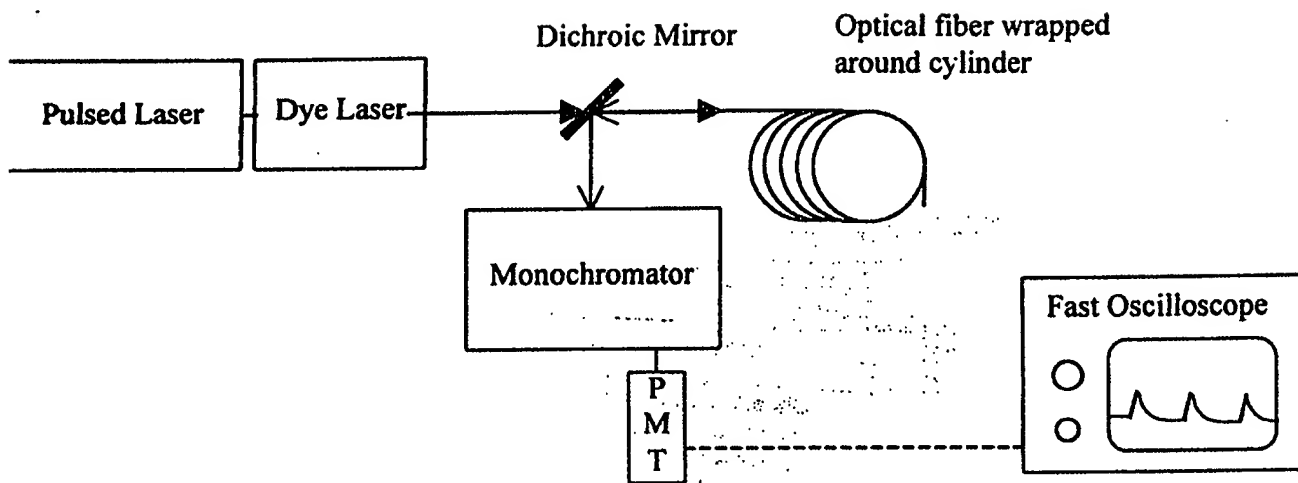


~~Figure 14: Two-fiber scheme: one detection fiber containing the reactant regions and one excitation fiber that periodically contacts the reactant regions.~~

Fig. 14



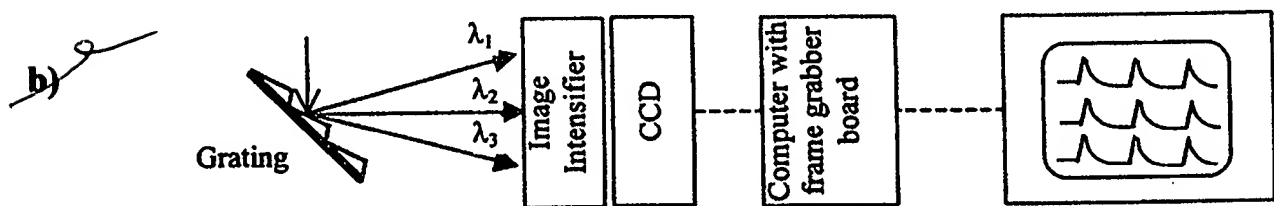
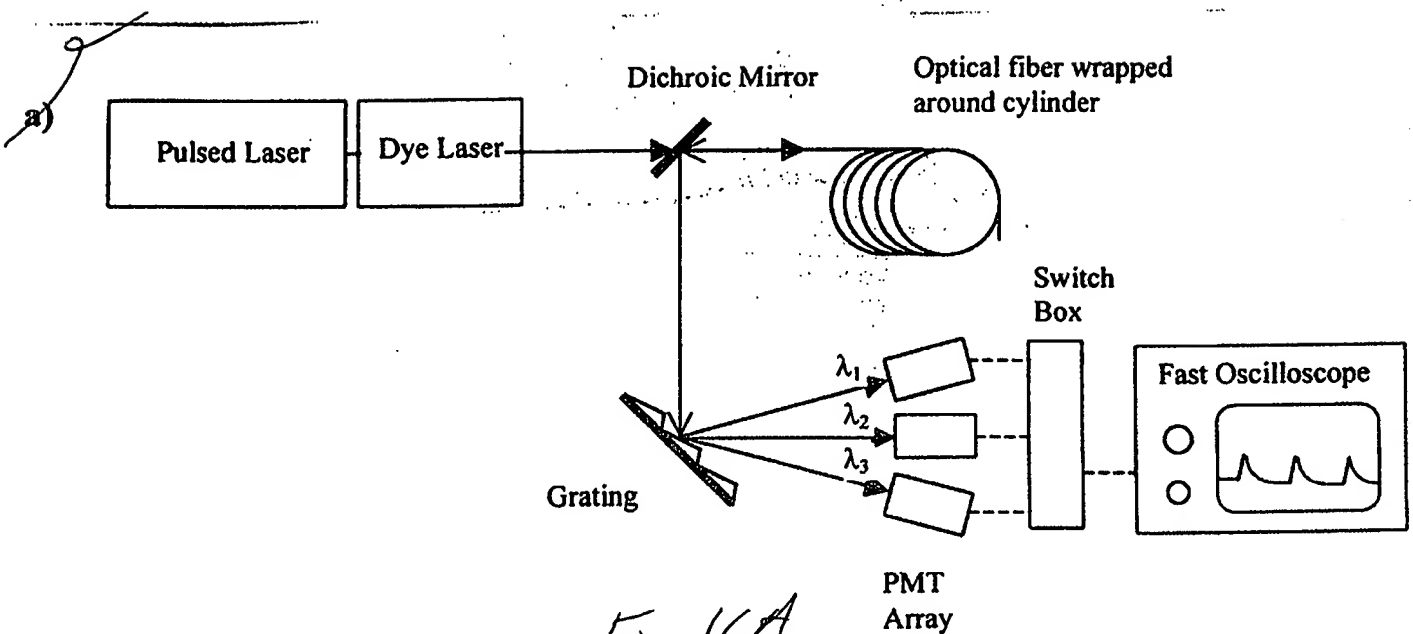
## Annotated Sheet



*Figure 15: Modified experimental setup (compare with Figure 3): A dye laser provides variable excitation wavelengths, while a monochromator allows only fluorescence of a specified wavelength region to reach the photomultiplier. Depending on the desired spectral range to be recorded, the monochromator can be replaced with band-pass filters or cutoff filters.*

Fig. 15

# Annotated Sheet



~~Figure 16: Experimental setup as in Figure 15 but with modified detection scheme. The fluorescence is dispersed according to wavelength by a grating (blazed, if required). For more detail, see text.~~

# Annotated Sheet

Figure 17

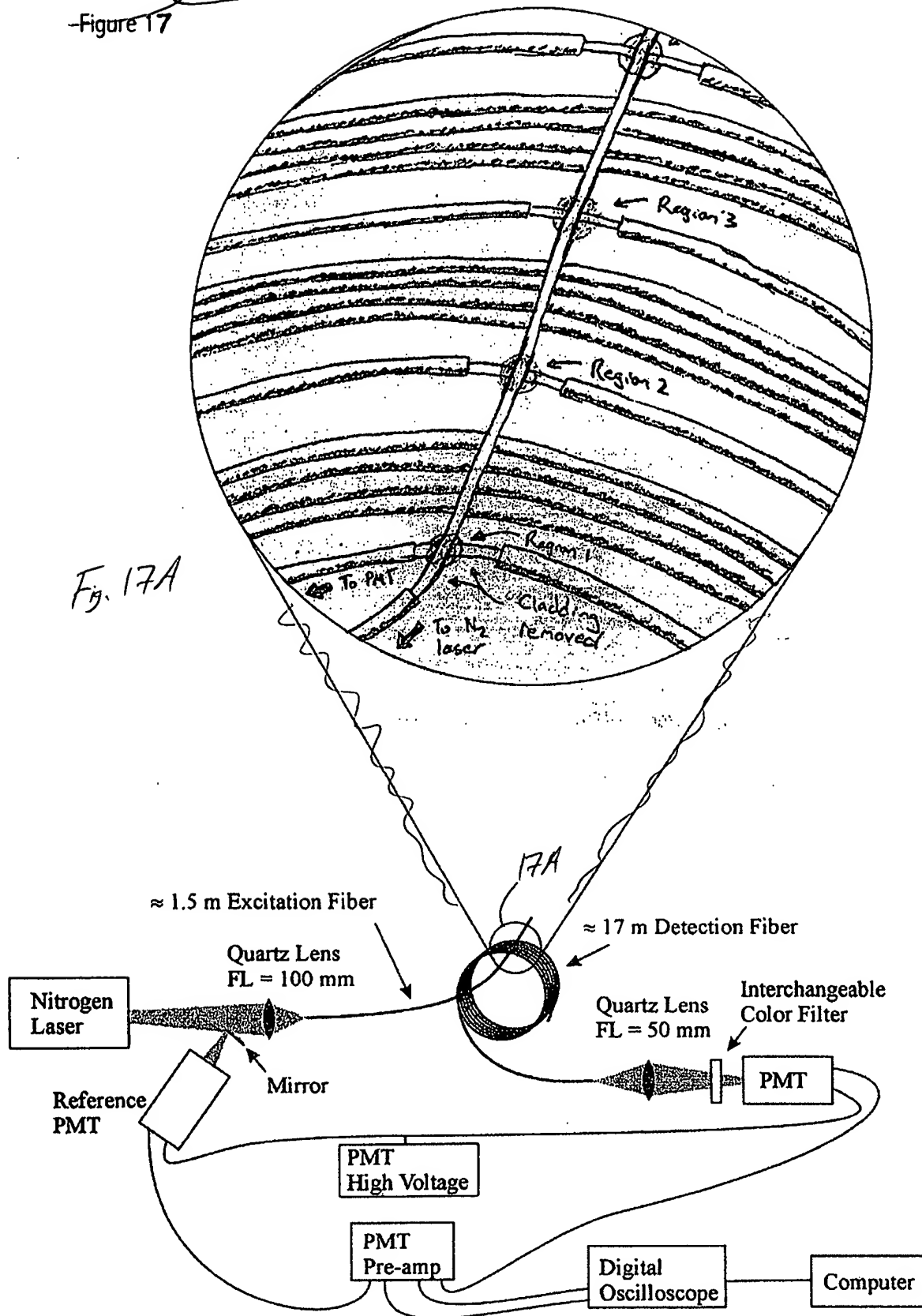


Fig. 17

# Annotated Sheet

Figure 18

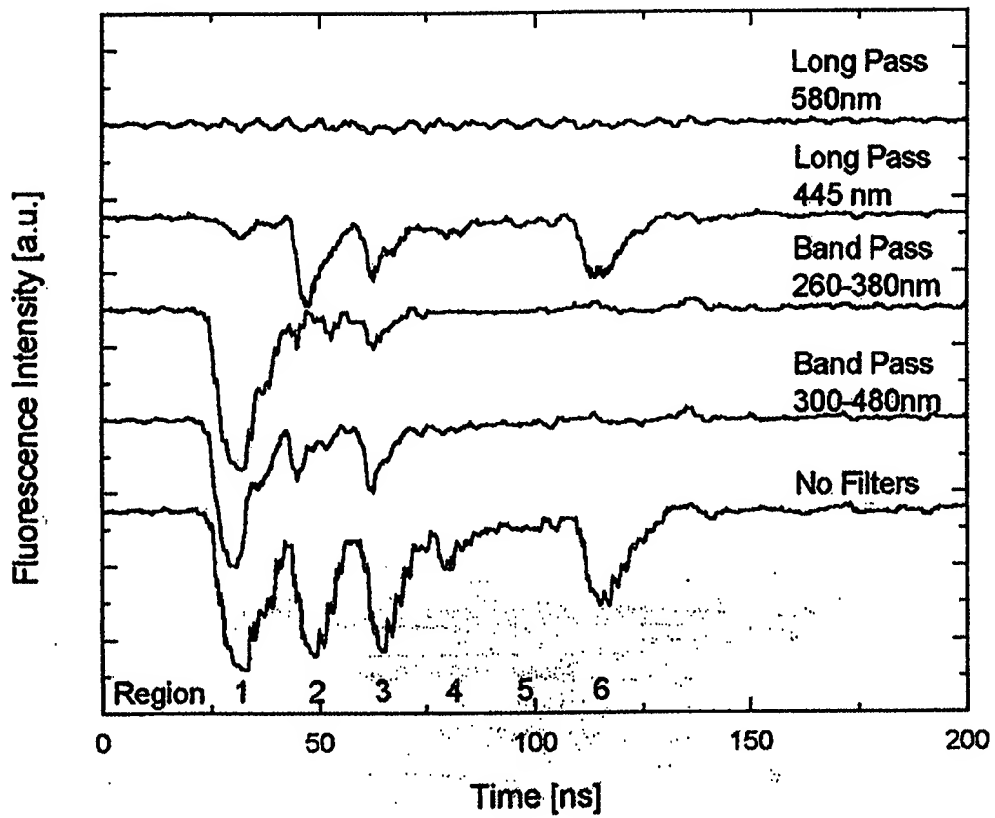


Fig. 18